

(19) World Intellectual Property  
Organization  
International Bureau



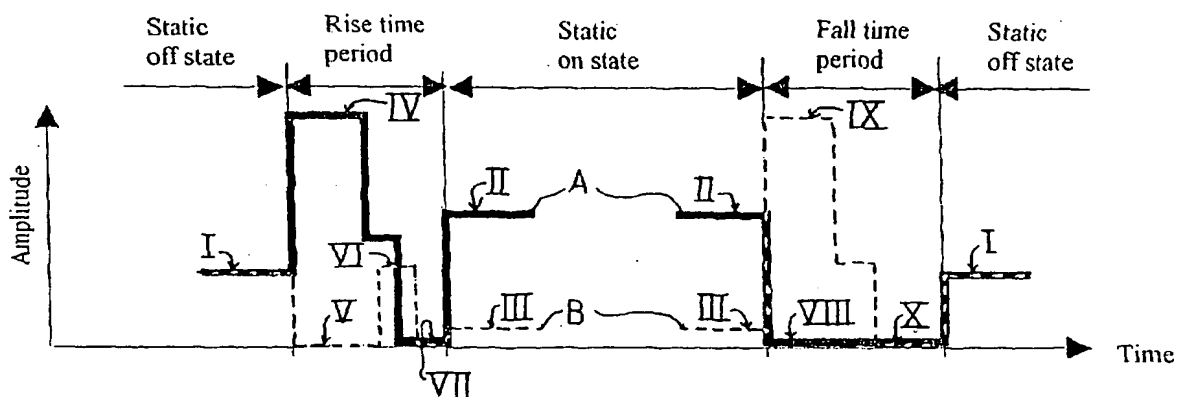
(43) International Publication Date  
18 March 2004 (18.03.2004)

PCT

(10) International Publication Number  
**WO 2004/023196 A1**

- (51) International Patent Classification<sup>7</sup>: G02F 1/01, 1/313, 1/225
- (21) International Application Number: PCT/FI2003/000649
- (22) International Filing Date: 4 September 2003 (04.09.2003)
- (25) Filing Language: Finnish
- (26) Publication Language: English
- (30) Priority Data: 20021583 4 September 2002 (04.09.2002) FI
- (71) Applicant (for all designated States except US): VALTION TEKNIILINEN TUTKIMUSKESKUS [FI/FI]; Vuorimiehentie 5, FIN-02150 Espoo (FI).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): AALTO, Timo [FI/FI]; Ruusutarhantie 3 B 12, FIN-00300 Helsinki (FI). KAPULAINEN, Markku [FI/FI]; Maininkitie 12 G 95, FIN-02320 Espoo (FI). HARJANNE, Mikko [FI/FI]; Kaskenpolttajantie 15 A, FIN-00670 Helsinki (FI). RÖNÖ, Markku [FI/FI]; Jämerintäival 10 G 119, FIN-02150 Espoo (FI).
- (81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR CONTROLLING AN OPTOELECTRONIC COMPONENT



(57) Abstract: A method for controlling an optoelectronic component that includes two waveguides (3 and 4). The refractive index of the first waveguide (3) is changed periodically with a first control signal (1), the amplitude of which is changed between a first amplitude level (I) and higher second amplitude level (II). The refractive index of the second waveguide (4) is changed periodically with a second control signal (2), the amplitude of which is changed between the aforementioned first amplitude level (I) and a lower third amplitude level (III). When the control signals are on their common first amplitude level (I), the refractive indices of the waveguides are equal and the phase difference between them is zero. When the first control signal is on the second amplitude level (II) and the second control signal on the third amplitude level (III), the refractive indices of the waveguides are unequal so that their mutual phase difference has a predetermined target value. For accelerating a phase-difference change both control signals are adjusted during both the rise and the fall time periods simultaneously so that their combined effect leads to a very fast phase difference change, which settles already before the refractive indices of the waveguides are settled.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/03/00649

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G02F 1/01, G02F 1/313, G02F 1/225

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6351578 B1 (M.BRINKMAN ET AL), 26 February 2002 (26.02.02), figure 8A, abstract --	1-20
A	US 6278822 B1 (E.DAWNAY), 21 August 2001 (21.08.01), abstract --	1-20
A	PATENT ABSTRACTS OF JAPAN vol.008,no.282 (P323) 22 December 1984(1984-12-22 ) & JP 59148031 A (TATEISHI DENKI KK) 24 August 1984 (1984-08-24) abstract --	1-20

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

4 December 2003

Date of mailing of the international search report

08-12-2003

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Erik Westin /itw

Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/03/00649

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0674210 A2 (FUJITSU LTD.), 27 Sept 1995 (27.09.95) --	1-20
A	US 6233070 B1 (Y.LU ET AL), 15 May 2001 (15.05.01), abstract -- -----	1-20

# INTERNATIONAL SEARCH REPORT

Information on patent family members

06/09/03

International application No.

PCT/FI 03/00649

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
US	6351578	B1	26/02/02	AU	2422101 A	26/03/01	
				CA	2380456 A	08/03/01	
				EP	1226467 A	31/07/02	
				JP	2003527624 T	16/09/03	
				US	2002037129 A	28/03/02	
				WO	0116648 A	08/03/01	
-----							
US	6278822	B1	21/08/01	AU	745594 B	21/03/02	
				AU	3718599 A	23/11/99	
				CA	2331069 A	11/11/99	
				CN	1307691 T	08/08/01	
				EP	1073929 A	07/02/01	
				GB	2332284 A,B	16/06/99	
				GB	9809458 D	00/00/00	
				IL	139126 D	00/00/00	
				JP	2002513952 T	14/05/02	
WO	9957600 A	11/11/99					
-----							
EP	0674210	A2	27/09/95	CA	2011954 A,C	14/09/90	
				DE	69025481 D,T	14/08/96	
				DE	69033696 D,T	21/06/01	
				EP	0387832 A,B	19/09/90	
				JP	2239223 A	21/09/90	
				JP	2894716 B	24/05/99	
				US	5074631 A	24/12/91	
				JP	2269309 A	02/11/90	
JP	2679223 B	19/11/97					
-----							
US	6233070	B1	15/05/01	CA	2309815 A	20/05/99	
				CN	1285931 T	28/02/01	
				EP	1031065 A	30/08/00	
				JP	2001523012 T	20/11/01	
				WO	9924867 A	20/05/99	
-----							